

# NASA TECH BRIEF

## *Marshall Space Flight Center*



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### Optimized Techniques and Requirements for Computer Improvement of Structural Weld Radiographs

#### The problem:

Because of the physical limitations of radiography, the primary tool for weld analyses, unsharp images can be produced, creating a possibility for error in reading the nature of the image. The detection of cracks and crack-like defects, such as porosity with a sharp tail, porosity connected by a crack, lack of sidewall fusion, and the complete penetration of two weld beads in plate material welded from both sides, has become imperative because of the low safety factors inherent in present technological programs such as the manned space mission.

#### The solution:

A recent study resulted in a hardware and software specification covering the requirements for using a computer to improve structural weld photographs.

#### How it's done:

Three scanning systems were used to digitize more than 15 weld radiographs. The performance of these systems was evaluated by determining modulation transfer functions and noise characteristics. Enhancement techniques were developed and applied to the digitized radiographs. The scanning param-

eters of spot size and spacing, and film density, were studied to optimize the information content of the digital representation of the image. Hardware requirements for an X-ray enhancement system were determined, and the system configuration was specified.

#### Notes:

1. The subroutines were written in FORTRAN IV for use under the VICAR image processing system.
2. These subroutines are available only as listings contained in the documentation.
3. Requests for further information may be directed to:

COSMIC  
112 Barrow Hall  
University of Georgia  
Athens, Georgia 30601  
Reference: B71-10492

#### Patent status:

No patent action is contemplated by NASA.

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